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ABSTRACT

This paper first presents an overview of studies which categorized types of learning styles, teaching models, and critical thinking modes. In models of teaching, four families of human orientation to learning are identified: information processing, personal, social, and behavioral systems. Learning styles are identified as: concrete/sequential; concrete/random; abstract/random; and abstract/sequential. Modes of critical thinking are risk taking, assumption analysis, or openess. The underlying assumption of these groupings is that there are differences in ways people are oriented to learning. The characteristics of individuals in each category are described. The Gregorc Transaction Ability Inventory (TAI), which diagnoses learning style as related to individual means of transacting with the environment in the process of acquisition of information, was administered to 66 student teachers at Montana State University. An analysis of the results projects nine conclusions on the relationship between critical thinking and learning styles and critical thinking and teaching models. Results of student teacher responses are tabulated in the appendix. (JD)

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INTEGRATING LEARNING STYLES, CRITICAL THINKING AND MODELS OF TEACHING IN THE STUDENT TEACHING EXPERIENCE

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Introduction

Man's efforts to identify distinct patterns of human behavior and establish consistent classifications associated with these patterns can be found throughout history. Both past and present research have relied on the establishment of four types, preferences, styles, views, philosophical bases, or temperaments to classify human behavior. Hippocrates' attempts to account for human behavior resulted in the four temperaments of human behavior: Choleric, Phlegmatic, Melancholic, and Sanguine. In Models of Teaching, Bruce Joyce and Marsha Weil identify four families of human orientation to learning: the Information Processing Family (IP), the Personal Family (PF), the Social Family (SF), and the Behavioral Systems Family (BS). Gregorc's Learning Style Delineator identifies four Learning Style Preferences Concrete/Sequential (CS), Concrete/Random (CR), Abstract/Random (AR) and Abstract/Sequential (AS).

The underlying assumption that there are differences in the way people are oriented to learning is fundamental to both Gregorc and Joyce/Weil's research. Both have identified four categories with similar identifying characteristics. Both focus on the process of learning: Gregorc directs his study at how the individual learns and Joyce/Weil are concerned with the instructional process with emphasis on learner needs. Both acknowledge there is considerable overlap in application of their established styles or models. Both have overlap in the terminology used to describe the families or styles. Learning Styles and the Models of Teaching both address integral components of the educational process. Learning and teaching are directly related in study and application.

Gregorc's definitions of the four learning styles have strong resemblance to Joyce/Weil's definitional approach to the four teaching models. The common traits between Gregorc's style preferences and Joyce/Weil's families can be used to establish a correlation helpful in understanding the educational processes of learning and teaching.

Gregorc defines the CS individual as one who has a preference for the objective, has a need for structure, and who is product oriented, and stresses the cognitive or intellectual development as a priority. Joyce and Weil define IP as a process of accessing, processing and organizing data in an effort to understand the environment. The models included in the IP family include: Concept Attainment, Inductive Thinking, Inquiry Training, Advanced Organizers, Developing Intellect, and Scientific Inquiry. The key words of the IP are scientific method, intellectual development, and generation of solutions.

The AP style is defined as those people who are subjective, spontaneous, person-oriented, and have high regard for the affective domain of learning. Feelings is a key word. The PF is defined as directed at selfhood or individual development. The models of teaching in the PF are Synectics, Awareness Training, and Classroom Meetings. The key words in these models are self expression, self concept, and affective domain in relation to the individual.

The CR style is characterized by individuals who are intuitive, insightful and perceptive to the feelings of others. The key words associated with the CR style are creative, innovative and risk taking. The SF is described as focused on cooperation and group interaction. The key words are group learning and affective domain in regard to

others. The models of teaching in the SF are Group Interaction, Role Playing, Jurisprudential Inquiry, Laboratory Training, and Social Inquiry.

The AS style individual is described as one who is evaluative, concerned with excellence and model oriented. The BS family is directed at modifying behavior and includes the following models of teaching: Mastery Learning, Direct Instruction, Learning Self Control, Simulations, and Assertive Training.

A comparison of the four learning styles and the four families of the models of teaching combined with the knowledge that both theories accept that movement within the classified styles and models is common. This supports the assumption that learning styles and teaching models are related. The CS learner is likely to develop strengths in the IP family, the AR learner is likely to develop in the PF, the AR learner is likely to develop strengths in the SP family, and the AS learner is likely to develop a teaching style based in the BS family of the models of teaching.

Steven Brookfield's Critical Thinking Models were used in this study. Brookfield defines Risk Taking as follows. Situations will vary and the teacher will change plans as opportunity presents itself. They may abandon an exercise because of a group discussion that captures the teacher's and student's imagination. During risk taking, the teacher acts almost strictly as facilitator. This is the type of teaching where no specific format is predesigned. In Assumption Analysis, students are asked to do the following in all cases: identify all assumptions, identify ethical questions that have been addressed, make sure all ambiguities, false reasoning, and clarity are

identified, examine contradictions, and complete self-evaluation. Openness is a means of being honest with onesself and with the other person involved. Openness gives students a chance to express themselves without any risk of embarrassment by their peers or by the facilitator or teacher. Using openness gives students a chance for alternative thinking.

Methodology

The instrument was administered to 66 student teachers at Montana State University--29 elementary and 27 secondary. We designated K-6 as elementary and 7-12 as secondary. Although Montana is basically rural, their student teaching sites varied from small schools of less than 100 population to large schools with in excess of 1000 students. The average age of the student teachers was 25 years with the youngest 21 and the oldest 38.

Instruments

The Gregorc Transaction Ability Inventory (TAI) is an instrument developed by Anthony Gregorc (1979) of the University of Connecticut. It diagnoses learning style as related to individual means of transacting with the environment in the process of acquisition of information. The TAI is based on the use of abstract or concrete reference points for thinking and sequential or random preference for ordering. Therefore there are four learning styles possible, with individuals being able to function in one or all of them. These are Concrete Sequential (CS), Abstract Random (AR), Abstract Sequential (AS), and Concrete Random (CR). The instrument consists of forty

words arranged in ten rows of four columns each. Subjects are asked to rate themselves on how these words related to the way they process information. It is a forced choice instrument: a subject gives a score of four to a word which best describes his/her information processing, then a three, a two, and a one to the word which is least like him/her. Therefore, in each column, a high score would be forty and a low score would be ten. A score of fifteen or less indicates a strong aversion to that particular style while a score of thirty or aboves indicates a strong preference for that particular style. Scores in between indicate that the subject processes in that style but has neither an aversion or preference for it.

We developed our own instrument for the Models of Teaching. The instrument delineates responses into the four specific families identified by Joyce/Weil: Information Processing Family, Social Family, Personal Family, and Behavioral Systems Family.

We also developed our own instrument for the Critical Thinking aspect researched by Brookfield. The instrument delineates responses into the three categories--Risk Takers, Assumption Analyzers, and those who are Openness Oriented.

Procedures

The TAI and Models of Teaching instruments ask the respondents to rank and order 1 through 4 on a Lichert scale, 4 being the highest rank and 1 being the lowest. The Critical Thinking instrument asks the respondents to rank and order 1 through 3 on a Lichert scale, 3 being the highest rank and 1 being the lowest. Results of student teacher responses are tabulated in the Appendix.

The correlation coefficient results are listed in the Appendix.

Conclusions

1. The majority of CS people in both elementary and secondary prefer IP as their model of teaching.
2. The majority of AR people in both elementary and secondary prefer PF as their model of teaching.
3. The number of AS people is very limited, but the majority of AS in our sample prefers IP as their model of teaching.
4. CR people do not have a strong teaching model preference.
5. The majority of CS people in both elementary and secondary used AA as their predominant critical thinking preference.
6. The majority of AR people in both elementary and secondary used the RT as their predominant critical thinking preference.
7. CR people use all three critical thinking processes.
8. The positive relationship between Teaching Models and Learning Styles is significant at the .05 level for both elementary and secondary student teachers.
9. The relationship between Critical Thinking and Learning Styles and Critical Thinking and Teaching Models is not significant at the .05 level.

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APPENDICES

ELEMENTARY
n = 29

	IP			PF			SF			BS			
	RT	AA	OP	RT	AA	OP	RT	AA	OP	RT	AA	OP	
CS	1	6										1	8
AR	1			8	1	1							11
AS		1											1
CR				3	1			1	4				9

SECONDARY
n = 27

	IP			PF			SF			BS			
	RT	AA	OP	RT	AA	OP	RT	AA	OP	RT	AA	OP	
CS		6						2					8
AR				5		1						1	7
AS		1								1			2
CR	1			2	2				4			1	10

LEARNING STYLE:

CS = CONCRETE/SEQUENTIAL
AR = ABSTRACT/RANDOM
AS = ABSTRACT/SEQUENTIAL
CR = CONCRETE/SEQUENTIAL

TEACHING MODEL:

IP = INFORMATION PROCESSING FAMILY
PF = PERSONAL FAMILY
SF = SOCIAL FAMILY
BS = BEHAVIORAL SYSTEMS FAMILY

CRITICAL THINKING:

RT = RISK TAKING
AA = ASSUMPTION ANALYSIS
OP = OPENESS

ELEMENTARY

LEARNING STYLES		TEACHING MODELS		CRITICAL THINKING	
y		x1		x2	
CS	1	IP	1	RT	1
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	BS	4	OP	3
AR	2	IP	1	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	AA	2
AR	2	PF	2	OP	3
AS	3	IP	1	AA	2
CR	4	PF	2	RT	1
CR	4	PF	2	RT	1
CR	4	PF	2	RT	1
CR	4	PF	2	AA	2
CR	4	SF	3	AA	2
CR	4	SF	3	OP	3
CR	4	SF	3	OP	3
CR	4	SF	3	OP	3
CR	4	SF	3	OP	3
N=	29	N=	29	N=	29
M=	2.379	M=	1.931	M=	1.759
SD=	1.187	SD=	0.785	SD=	0.773

Elementary
Learning Styles vs. Teaching Models
Regression Output:

Constant	0.783784	
Std Err of Y Est	1.0298	
R Squared	0.29868	0.546516
No. of Observations	29	
Degrees of Freedom	27	
X Coefficient(s)	0.826255	
Std Err of Coef.	0.243662	

Elementary
Learning Styles vs. Critical Thinking
Regression Output:

Constant	1.906375	
Std Err of Y Est	1.210688	
R Squared	0.030663	0.175108
No. of Observations	29	
Degrees of Freedom	27	
X Coefficient(s)	0.268924	
Std Err of Coef.	0.290991	

SECONDARY

LEARNING STYLES		TEACHING MODELS		CRITICAL THINKING	
y		x1		x2	
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	IP	1	AA	2
CS	1	SF	3	AA	2
CS	1	SF	3	AA	2
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	RT	1
AR	2	PF	2	OP	3
AR	2	BS	4	OP	3
AS	3	IP	1	AA	2
AS	3	BS	4	RT	1
CR	4	IP	1	RT	1
CR	4	PF	2	RT	1
CR	4	PF	2	RT	1
CR	4	PF	2	AA	2
CR	4	PF	2	AA	2
CR	4	SF	3	OP	3
CR	4	SF	3	OP	3
CR	4	SF	3	OP	3
CR	4	SF	3	OP	3
CR	4	BS	4	OP	3
N=	27	N=	27	N=	27
M=	2.519	M=	2.148	M=	1.926
SD=	1.258	SD=	0.970	SD=	0.766

Secondary
Learning Styles vs. Teaching Models
Regression Output:

Constant	1.425656	
Std Err of Y Est	1.202742	
R Squared	0.153858	0.392248
No. of Observations	27	
Degrees of Freedom	25	
X Coefficient(s)	0.508746	
Std Err of Coef.	0.238612	

Secondary
Learning Styles vs. Critical Thinking
Regression Output:

Constant	2.028037	
Std Err of Y Est	1.291706	
R Squared	0.024055	0.155096
No. of Observations	27	
Degrees of Freedom	25	
X Coefficient(s)	0.254673	
Std Err of Coef.	0.324432	

ELEMENTARY

	IP			PF			SF			BS			
	RT	AA	OP	RT	AA	OP	RT	AA	OP	RT	AA	OP	TOTAL
CS	1	6	0	0	0	0	0	0	0	0	0	1	8
AR	1	0	0	8	1	1	0	0	0	0	0	0	11
AS	0	1	0	0	0	0	0	0	0	0	0	0	1
CR	0	0	0	3	1	0	0	1	4	0	0	0	9
	2	7	0	11	2	1	0	1	4	0	0	1	29

ELEMENTARY

	IP			PF			SF			BS			
	RT	AA	OP	RT	AA	OP	RT	AA	OP	RT	AA	OP	TOTAL
CS	3.4%	20.7%	0	0	0	0	0	0	0	0	0	3.4%	27.59%
AR	3.4%	0	0	27.6%	3.4%	3.4%	0	0	0	0	0	0	37.93%
AS	0	3.4%	0	0	0	0	0	0	0	0	0	0	3.45%
CR	0	0	0	10.3%	3.4%	0	0	3.4%	13.8%	0	0	0	31.03%
	6.9%	24.1%	0	37.9%	6.9%	3.4%	0	3.4%	13.8%	0	0	3.4%	100.00%

SECONDARY

	IP			PF			SF			BS			
	RT	AA	OP	RT	AA	OP	RT	AA	OP	RT	AA	OP	TOTAL
CS	0	6	0	0	0	0	0	2	0	0	0	0	8
AR	0	0	0	5	0	1	0	0	0	0	0	1	7
AS	0	1	0	0	0	0	0	0	0	1	0	0	2
CR	1	0	0	2	2	0	0	0	4	0	0	1	10
	1	7	0	7	2	1	0	2	4	1	0	2	27

SECONDARY

	IP			PF			SF			BS			
	RT	AA	OP	RT	AA	OP	RT	AA	OP	RT	AA	OP	TOTAL
CS	0	22.2%	0	0	0	0	0	7.4%	0	0	0	0	29.63%
AR	0	0	0	18.5%	0	3.7%	0	0	0	0	0	3.7%	25.93%
AS	0	3.7%	0	0	0	0	0	0	0	3.7%	0	0	7.41%
CR	3.7%	0	0	7.4%	7.4%	0	0	0	14.8%	0	0	3.7%	37.04%
	3.4%	24.1%	0	24.1%	6.9%	3.4%	0	6.9%	13.8%	3.7%	0	6.9%	100.00%